

Table 2.12 Coefficient of Thermal Expansion

α (in/in/°C $\times 10^{-6}$)	Type III Girders				Type IV Girders			
	Girder C4		Girder D4		Girder A4		Girder B4	
	VWG	ERSG	VWG	ERSG	VWG	ERSG	VWG	ERSG
Gage	6.7	4.9	6.7	4.9	6.7	4.9	6.7	4.9
Cylinder	2.06	4.68	2.14	4.03	2.08	3.74	1.96	3.92
Total	8.76	9.58	8.84	8.93	8.78	8.64	8.66	8.82

The FHWA also performed coefficient of thermal expansion tests on two 4 x 8 in cylinders in accordance with AASHTO P 60; one specimen from the concrete used for the Type III girders and one for the Type IV girders. The results are given below in Table 2.13.

Table 2.13 Coefficient of Thermal Expansion (FHWA, 2001)

	Type III Girder	Type IV Girder
α (in/in/°C)	7.4×10^{-6}	8.7×10^{-6}

The coefficient of thermal expansion of concrete varies with the type of aggregate used. The range for normal weight concrete made with the same aggregate used in the bridge girders is generally expected to be 9 to 12.5×10^{-6} in/in/°C (5 to 7×10^{-6} in/in/°F) (Collins et al. 1997, PCI Handbook 5th Ed. 1999). So the measured coefficient of thermal expansion for this concrete falls just below the values presented in literature. Coefficient of thermal expansion was not specified as a performance criterion.

2.7 Creep

In prestressed concrete structures, the stress and strain at any section change over time, during which creep and shrinkage of concrete and relaxation of the steel develop